U.S. Fish & Wildlife Service

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Morris County, New Jersey Operable Unit 3 of the Asbestos Dump Superfund Site

Restoration Plan and Environmental Assessment

Prepared by:

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Acronyms and Abbreviations

ACM	Asbestos Containing Material
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	Contaminants of Concern
DOI	U. S. Department of the Interior
EA	Environmental Assessment
ESE	Environmental Science and Engineering, Inc.
FWEC	Foster Wheeler Environmental Corporation
GSNWR	Great Swamp National Wildlife Refuge
IT	International Technologies Corporation
NEPA	National Environmental Policy Act
NGC	National Gypsum Company
NJDEP	New Jersey Department of Environmental Protection
NJFO	New Jersey Field Office, U. S. Fish & Wildlife Service
NPL	National Priorities List
NRDAR	Natural Resource Damage Assessment and Restoration
NUS	NUS Corporation
OU-3	Operable Unit 3 of the Asbestos Dump Superfund Site
RI	Remedial Investigation
RP	Restoration Plan

RP/EA	Restoration Plan and Environmental Assessment
SA	Site Assessment
Service	U. S. Fish & Wildlife Service
Trustee	Natural Resource Trustee
UAR	Unimproved Access Road
U.S. EPA	U.S. Environmental Protection Agency

Final Restoration Plan and Environmental Assessment
Operable Unit 3 of the Asbestos Dump Superfund Site
Morris County, New Jersey

1.0 Introduction: Purpose and Need for Restoration

This document constitutes the final Restoration Plan and Environmental Assessment (RP/EA) on proposed restoration actions associated with Operable Unit 3 (OU-3) of the Asbestos Dump Superfund Site, located within the "Dietzman Tract" (Refuge Tract 230) of the Great Swamp National Wildlife Refuge (GSNWR), Morris County, New Jersey. This document was prepared by the U. S. Fish & Wildlife Service's (Service) New Jersey Field Office (NJFO) in close coordination with the GSNWR staff. The purpose of this document is to address the restoration of natural resources injured, impaired, or lost by the origination, existence, and remediation of OU-3, and to describe alternatives for restoring the injured resources and the services these resources provided using funds collected as natural resource damages for these injuries, pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended, commonly known as Superfund, (42 U.S.C. 9601 *et seq.*).

The purpose of restoration is to address injuries to natural resources, including the services, ecological functions, and human uses the resources provided; this includes returning the resources to a without-release, or baseline condition. Restoration actions may be necessary because injured natural resources may not have the capacity to reestablish their functions within an ecosystem in a timely manner without intervention. In addition to the cost to restore resources to baseline condition, CERCLA authorizes natural resource trustees (Trustee) to recover compensation for losses suffered by the public during the period the resources are injured, referred to as interim lost use, and to spend that compensation on additional restoration actions, including acquisition and rehabilitation of additional replacement resources.

On April 24, 1984, the U. S. Environmental Protection Agency (U. S. EPA) issued a letter to the National Gypsum Corporation (NGC), notifying the company of its potential liability as a Potentially Responsible Party for the release of hazardous substances at OU-3. On October 28, 1990, NGC filed for bankruptcy under Chapter 11. On May 29, 1991, the United States, in behalf of the Department of the Interior (DOI), filed a general unsecured claim in the amount of $3,500,000 for natural resource injuries and related losses at OU-3. On February 11, 1993, a U.S. Bankruptcy Court approved a Settlement Agreement. Pursuant to the settlement and claim, the DOI received securities which have since been sold. The proceeds of the sale were deposited in an interest bearing account in the DOI s Natural Resource Damage Assessment and Restoration (NRDAR) Fund for future restoration of resources lost or injured as a result of contamination at OU-3. As of July 2000, the OU-3 restoration account was in excess of $4,500,000 dollars.

Because of the need to file a claim expeditiously in the NGC bankruptcy proceedings, a formal natural resource damage assessment was not conducted on OU-3. Remedial activities (e.g., site characterization, work plan development, implementation of the selected remedial action) at OU-3 were conducted until November of 1998. The final remedial operation and maintenance plan, and remedial action report were completed in August 1999. On-site remedial activities disrupted some wetland areas and created others. Restoration planning was deferred until the outcome of the on-site remedial actions were evaluated.

The Service has prepared this final RP/EA to address and evaluate restoration alternatives related to natural resource injuries at OU-3. The purpose of this RP/EA is to design, coordinate, and evaluate possible alternatives that will restore, rehabilitate, replace, or acquire natural resources and the services provided by those resources equivalent to those injured as a result of the origination, existence, and remediation of OU-3. This RP/EA describes the affected environment, identifies potential restoration alternatives and their plausible ecological and social consequences, and describes the selected alternative.

1.1 Authorities

The Service prepared this final RP/EA to fulfill requirements under CERCLA, to develop a restoration plan prior to spending recovered natural resource damages on restoration. In addition, this document constitutes an environmental assessment as defined under the National Environmental Policy Act (NEPA) of 1969, as amended (42 U.S.C. 4321 *et seq.*) and addresses the potential impacts of proposed restoration actions on the quality of the physical, biological, and cultural environment. Authority for NRDAR also lies under the Federal Water Pollution Control Act of 1972, as amended, commonly referred to as the Clean Water Act (33 U.S.C. 1251 *et seq.*). The NRDAR regulations for hazardous substances are codified at 43 CFR Part 11. The NRDAR regulations are available to Trustees for developing natural resource damage claims based on the cost of restoration and the value of interim public losses, and also contain useful concepts and guidance for post-recovery restoration planning where no formal damage assessment was prepared. Other laws, regulations, and policies that may be applicable to the development and implementation of this NRDAR RP/EA include the following: the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*); the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. 703 *et seq.*); the National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997 (PL 105-57) (16 U.S.C. 668dd *et seq.*); the Wilderness Act of 1964, as amended (16 U.S.C. 1131 *et seq.*); the Great Swamp Wilderness Act of 1968 (PL 90-532); the Fish and Wildlife Coordination Act of 1934, as amended (16 U.S.C. 661 *et seq.*); the Refuge Recreation Act of 1962, as amended (16 U.S.C. 460k *et seq.*); the Refuge Revenue Sharing Act of 1935, as

amended (U.S.C. 715s *et seq.*); and, the U. S. Fish and Wildlife Mitigation Policy of 1981. Alternatives described in this document will be conducted in compliance with all applicable State, Federal, and local regulations.

1.2 Trustee Responsibilities Under CERCLA and Federal Agency Obligations under NEPA

Executive Order 12580 and its implementing regulations (40 CFR 300.600) designated Federal officials who act in behalf of the public as Trustees for natural resources. The Secretary of Interior was designated Trustee for natural resources, including their supporting ecosystems, belonging to, managed by, held in trust by, pertaining to, or otherwise controlled by the DOI. Among these trust resources are: migratory birds; anadromous fish; some marine mammals; endangered species and their respective habitats; and Federal lands managed by DOI. This Trustee authority has been delegated by the Secretary to the Service Director. The Service s Region 5 Regional Director has been designated as Authorized Official to act on behalf of the Secretary as Trustee for natural resources related to OU-3.

Under CERCLA, Trustees are authorized to assess damages for injury to, destruction of, or loss of natural resources resulting from the release or threat of release of hazardous substances for those resources under their trusteeship, and may seek to recover such damages from responsible parties. Monetary damages recovered by Trustees can only be used to restore, replace, or acquire natural resources equivalent to those injured (42 U.S.C. 9607 (f)(1)).

Section 111(i) of CERCLA requires the Trustees to develop a Restoration Plan (RP) prior to spending recoveries to implement restoration actions, and to obtain public comment on that plan. To fulfill this requirement, the RP/EA describes a reasonable number of possible alternatives for achieving restoration for natural resource injuries and facilitates the selection of the preferred alternative. Moreover, the RP/EA identifies the preferred alternative and describes how settlement monies will be spent to achieve restoration goals.

Under NEPA, Federal agencies must identify and evaluate environmental impacts that may result from Federal actions. Federal agencies can prepare an Environmental Assessment (EA) to facilitate such an evaluation. This final RP/EA integrates NEPA requirements by: summarizing the affected environment; describing the purpose and need for action; identifying alternative actions; assessing each alternative's applicability and environmental consequences; and, summarizing opportunities for public participation in the decision process. When appropriate and on a site-specific basis, the Service will conduct additional NEPA analysis and make those analyses publicly available.

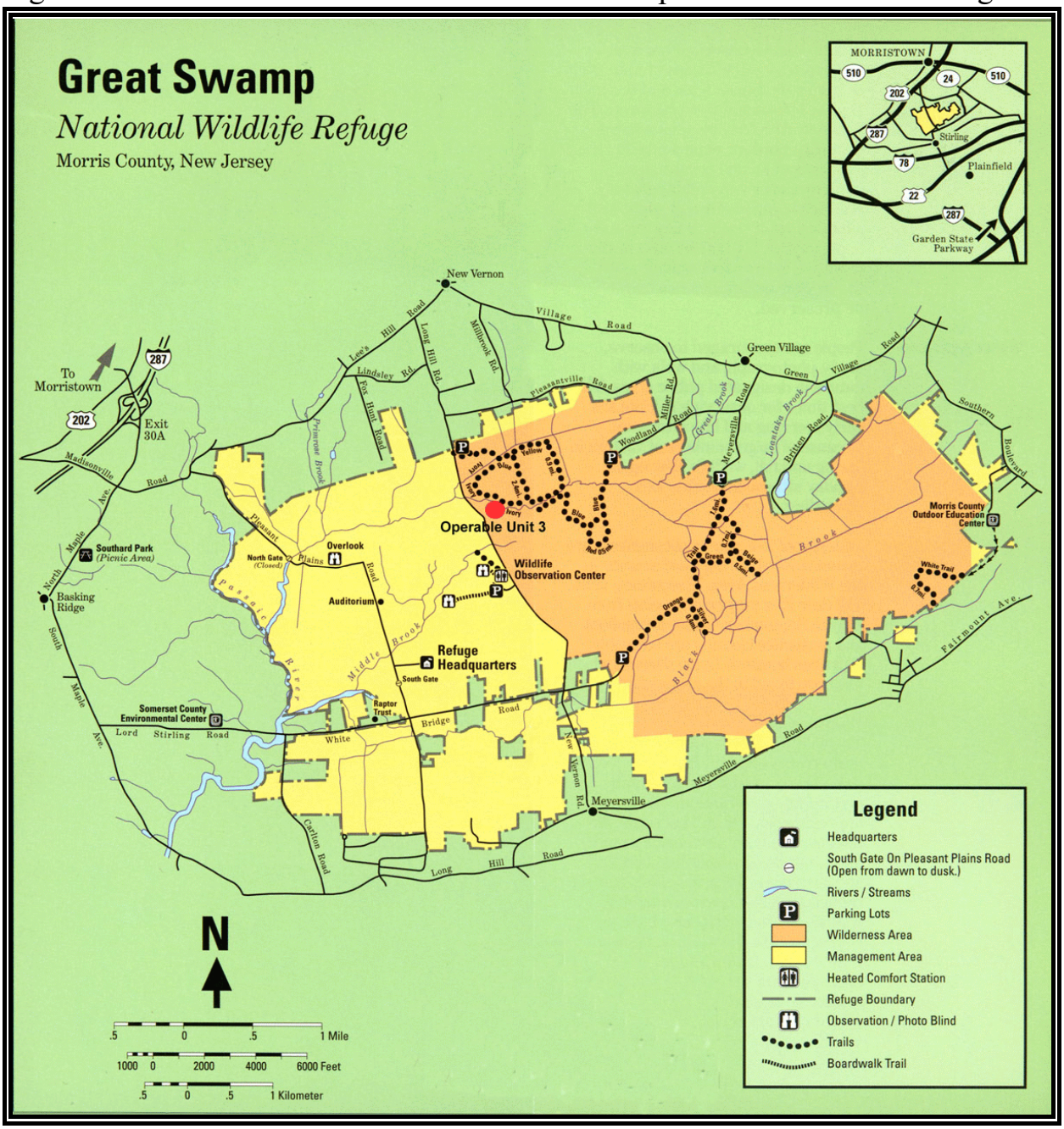
1.3 Affected Area

1.3.1 Site Description

The GSNWR is located approximately 25 miles west of New York City s Time Square and approximately 7 miles south of Morristown, in Morris County, New Jersey. The GSNWR encompasses approximately 7,500 acres, of which 3,660 acres are designated and managed as a

National Wilderness Area. The GSNWR consists of wooded upland and palustrine wetland areas with low hydraulic gradients primarily drained by Great Brook and Black Brook, tributaries to the Passaic River. Operable Unit-3 is located within Refuge Tract 230, a 104.4 acre parcel of swamp, marsh, and woodlands on the northwestern corner of the Great Swamp Wilderness Area
(Figure 1).

Figure 1. Location of OU-3 within the Great Swamp National Wildlife Refuge



Nicholas Dietzman owned the 104.4 acres of what is today Refuge Tract 230 from 1918 to 1968. Throughout ownership of the property, Mr. Dietzman disposed of refuse collected from neighboring communities in open pits or on the land surface at OU-3. For at least six years prior to the purchase of the property by the Refuge in 1968, refuse and slag from the NGC plant in Millington, New Jersey were also landfilled on the site. Solid waste material dredged from lagoons at the NGC plant as well as broken finished asbestos shingles, polyurethane foam, general scrap, scale from troughs, vats, and other equipment, and residues collected from drums of paint waste and fungicide were transported to OU-3. The paint used in the manufacturing of asbestos shingles at NGC was formulated with phenylmercuric acetate.

The disposal operations at OU-3 were not conducted under any type of permit from municipal, county, State, or Federal agencies. Local zoning laws of 1968 in Harding Township prohibited the operation of disposal sites. Disposal activities at OU-3 ceased in 1968 after the property was acquired as Refuge land. The Service first learned of the potential hazards of asbestos on the former Dietzman property as a result of notification from the New Jersey Department of Environment Protection (NJDEP) on June 27, 1978 (NUS, 1984).

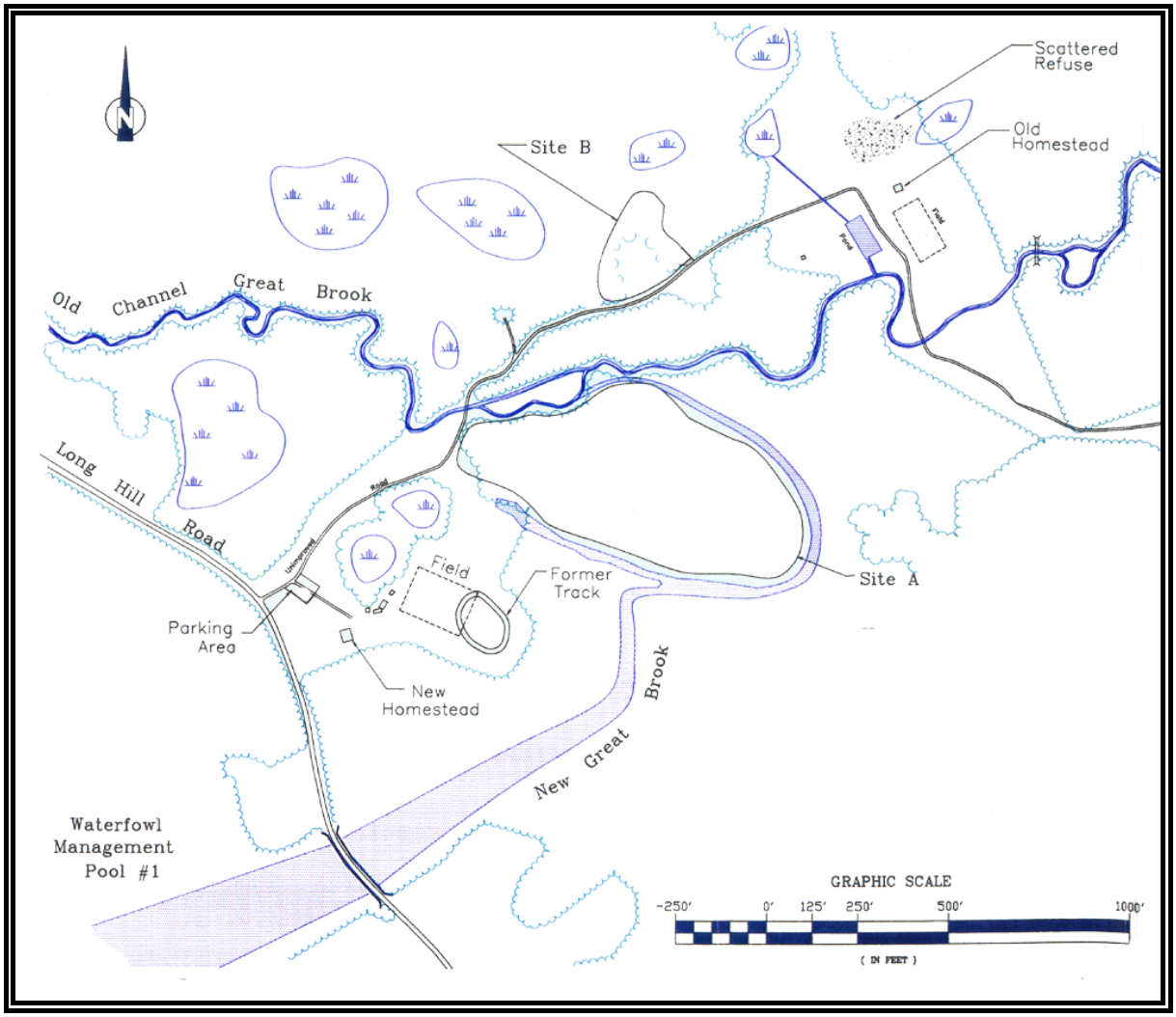
There were three main disposal sites on OU-3: an unimproved access road (UAR); a five-acre landfill termed "Site A"; and a one-half acre landfill termed "Site B" (Figure 2). The UAR was covered with a 9-inch layer of asbestos containing material (ACM), mostly asbestos tile and siding. The UAR was approximately 500 yards long, and approximately 10 feet wide.

The UAR began at Long Hill Road, continued northeast across OU-3 past Sites A, terminating at the southeastern corner of Site B. Site A was located southeast of the UAR, approximately 600 feet from Long Hill Road. Site A was surrounded on three sides by Great Brook and emergent wetlands and to the north by upland forest. Site B, surrounded by upland forest, was located north of Great Brook and Site A, on the northwest side of the former UAR. Several small refuse areas in the vicinity of Sites A and B were also identified; these sites primarily contained scrap debris and glass.

Site A contained asbestos tile and siding fragments underlain by fibrous asbestos varying from 1 to 6 feet in depth. Approximately 40 percent of the landfilled material was below the water table in a natural marsh area. The ground surface at Site A was littered with refuse, urethane foam, asbestos tile, and scrap metal. Buried drums, containing primarily acids, solvents, and mercuric compounds, and other metallic debris were located at Site A during the remedial investigation (Hart, 1987; ESE, 1992; FWEC, 1997).

Site B was characterized as an upland section of the swamp. The northern portion of Site B

Figure 2. Operable Unit 3: Site Configuration (adapted from FWEC, 1997)



was comprised of a small palustrine wetland which was usually unsaturated. Site B contained clay mixed with asbestos fibers underlain by organic-rich clays and silty sands. The wastes were deposited approximately 5 feet above the observed groundwater table. The average thickness of the ACM at Site B was 2 feet, and was underlain by a 2 foot layer of metal, glass, and refuse (ESE, 1992).

The GSNWR is inhabited by approximately 600 species of plants (including 215 species of wildflowers), 29 species of fish, 33 species of mammals, and 39 species of reptiles and amphibians, and more than 220 species of birds (of which almost half nest on the Refuge) (USFWS 1985, Kane et al. 1985). Many of these species are expected to occur at the Dietzman

Tract. More than 25 species known to use the GSNWR are listed by the State of New Jersey as being threatened or endangered, including the wood turtle (*Clemmys insculpta*), blue-spotted salamander (*Ambystoma laterale*), and bog turtle *(Clemmys muhlenbergii)*, which is also Federally listed as threatened. All species occurring on the Refuge along with their associated habitats, are natural resources under the trusteeship of the DOI.

1.3.2 Natural Resource Injury

Natural resource injury is defined under 43 CFR 11.14 as "...a measurable adverse change, either long- or short-term, in the chemical or physical quality or the viability of a natural resource resulting either directly or indirectly from exposure to a...release of a hazardous substance, or exposure to a product of reactions resulting from the...release of a hazardous substance." Injuries to biological resources include death, behavioral abnormalities, cancer, genetic mutations, physiological malformations (including malfunctions in reproduction), and physical deformation (43 CFR 11.62 (f)). Biological resources may also be injured when they contain hazardous substance concentrations that exceed action or tolerance levels under Federal or State laws regulating human consumption. Injury to surface and ground water resources is defined to include concentrations of hazardous substances in the water or sediment of sufficient concentrations to have caused injury to other natural resources, such as biological resources (43 CFR 11.62 (b) & (c)).

When natural resources have been injured as a result of releases of hazardous substances, Trustees are authorized to recover compensation for the cost of restoration, as well as compensation for the loss of availability of the resource to public use between the time the injury occurred (or 1980, CERCLA s date of enactment, if later) and the date the resources are restored to their "without-release" baseline condition. Lost public uses for which Trustees may recover include such things as hiking and bird watching.

Although no formal, full-scale natural resource damage assessment was conducted to prepare the claim for compensation recovered from NGC in the bankruptcy proceedings, for restoration planning purposes it is useful to examine and discuss the types of natural resource injuries that could be expected to occur as a result of the hazardous substances found at OU-3, the unavoidable injuries resulting from the remedial actions, and the potential or estimated natural resource service losses.

The investigation of environmental risks and contamination that could cause natural resource injury at OU-3 began in the early 1980's. On December 30, 1982, the U. S. EPA, citing asbestos as the contaminant of concern (COC) for potential human health risks, proposed listing the Asbestos Dump (also known as the Millington Dump and its 3 satellite sites which included

OU-3) on the National Priority List (NPL). On August 8, 1983, the U. S. EPA added the Asbestos Dump to the final listing of the NPL (CERCLA ID# NJD980654149). Then, on April 24, 1984, the U. S. EPA issued a letter to NGC notifying the company of its status as a Potentially Responsible Party.

From 1985 to 1986, NGC conducted a remedial investigation (RI) at OU-3, and in 1987 submitted a RI report to the U.S. EPA (Hart, 1987). The U.S. EPA determined that the report did not sufficiently delineate the nature and extent of contamination at OU-3. Accordingly, a Supplemental RI Work Plan (McLaren Hart, 1991) was submitted on behalf of NGC in response to the review of the 1987 RI by the U.S. EPA.

During 1991 and 1992, Environmental Science and Engineering, Inc., (ESE), under contract to the Service, completed a Site Assessment (SA) of OU-3 in support of the Proof of Claim during bankruptcy proceedings (ESE, 1992). The ESE SA determined that elevated levels of asbestos observed in surface water adjacent to OU-3 posed a moderate to high potential for significant adverse ecological effects and that elevated levels of airborne asbestos at OU-3 potentially posed a significant cancer risk to humans. Further, ESE determined that elevated levels of lead observed in surface water and sediments adjacent to OU-3 posed a high potential for significant adverse ecological effects.

The SA also identified the following as potential COCs at OU-3: asbestos, copper, lead and zinc. All four contaminants were identified as potential COCs for biota present in the area; asbestos was additionally identified as a potential COC for humans.

In 1995, Foster Wheeler Environmental Corporation (FWEC), formerly Enserch Environmental, prepared the Final Historical Review Report (Enserch Environmental, 1995) for the Service to summarize analytical data related to OU-3 and identify data gaps. A Supplemental Phase II RI of OU-3 (FWEC, 1997) was prepared to address the data gaps. Prior to remedial activities in 1997, soil and groundwater sampling by FWEC indicated that trichloroethane, mercury, and possibly methylene chloride had leaked into the environment from drums buried at OU-3. Surface soils on the western side of Site A contained concentrations of lead, mercury, nickel, thallium, and vanadium exceeding residential soil clean-up criteria, but usually below industrial soil clean-up criteria established by the NJDEP (NJDEP, 1998). Mercury levels in surface soils were elevated throughout most of the central portion of Site A, and to a lesser extent in subsurface samples.

The majority of surface soils at Site B contained several metals, primarily lead. Lead concentrations were in excess of NJDEP residential soil clean-up criteria and appeared to be

associated with ACM and the underlying debris. The soil contamination at OU-3 is likely to have resulted in injury to natural resources at Site A and Site B, as defined in 43 CFR 11.14 (v).

Although minor detections of other metals and organics were found in soils at OU-3, no substantial levels of these compounds were reported by FWEC (FWEC, 1997). In June 1996, a qualitative wildlife survey conducted at OU-3 as part of the Phase II RI, documented a total of 8 mammalian, five reptilian, five amphibian, and 39 avian species (FWEC, 1997). Further, biological sampling during the Phase II RI in the vicinity of OU-3 suggested the following:

1. fish condition and community analysis of Great Brook did not indicate that contaminants released from OU-3 were causing adverse effects to fish under the 1997 pre-remedial conditions;

2. concentrations of lead, nickel, and mercury were elevated in frogs sampled at Site A and Site B relative to a reference site, and thus may serve as a contaminant pathway for higher trophic level species; and,

3. chemical and pathological analysis of beaver and woodchuck tissues collected in the vicinity of OU-3 did not indicate that contaminants present at OU-3 were producing detectable adverse effect on those herbivorous species.

The above findings suggest that the effect of contaminants present at OU-3 were principally, but not exclusively, contained to the site.

Contaminant investigations conducted on OU-3 consistently reported that aside from asbestos, mercury concentrations at Site A and lead concentrations at Site B were the principal risk drivers (Hart, 1987; ESE, 1992; FWEC, 1997). Contaminant Hazard Reviews prepared by the Service state:

> "Mercury is a known mutagen, teratogen, and carcinogen. At comparatively low concentrations in birds and mammals, it adversely affects reproduction, growth and development, behavior, blood and serum chemistry, motor coordination, vision, hearing, histology, and metabolism. It has a high potential for bioaccumulation and biomagnification, and is slow to depurate. Organomercury compounds were more effective in producing adverse effects than were inorganic mercury compounds; however, effects were significantly enhanced or ameliorated by numerous biotic and nonbiological modifiers....Mercury at comparatively low concentrations adversely affects the reproduction, growth, behavior, metabolism, blood chemistry, osmoregulation, and oxygen exchange of marine and freshwater organisms. In general,

> the accumulation of mercury by aquatic biota is rapid, and depuration is slow. It is emphasized that organomercury compounds, especially methylmercury, were significantly more effective than inorganic mercury compounds in producing adverse effects and accumulations" (Eisler 1987).

With regard to lead, the Service s Contaminant Hazard Reviews state:

> "All credible evidence indicates that lead is neither essential nor beneficial to living organisms, and that all measured effects are adverse--including those on survival, growth, reproduction, development, behavior, learning, and metabolism....Lead adversely affects survival, growth, reproduction, development, and metabolism of most species under controlled conditions, but its effects are substantially modified by numerous physical, chemical, and biological variables. In general, organolead compounds are more toxic than inorganic lead compounds, food chain biomagnification of lead is negligible, and the younger, immature organisms are most susceptible....In aquatic environments, waterborne lead was the most toxic form" (Eisler 1988).

Interpretation of historical aerial photographs document that prior to being filled with asbestos spoils and other wastes, the 5.58 acres of dump sites comprised of Site A, Site B, and the UAR were predominantly marshy wetland. This marshy wetland was easily accessible for dumping from the surrounding uplands, and as the wetland was filled with ACM, deeper access to the interior wetland was established; ultimately Site A became a mound of ACM. The dumping of ACM, chemical-containing drums some of which subsequently leaked, and other debris at OU-3 clearly degraded the wetland, disrupted the ecological services it provided, and likely compromised the assimilative capacity (the ecosystem s ability to repair itself by digesting, degrading, transforming, absorbing, or otherwise eliminating the pollutants placed in it (61 Federal Register 20599)) of the wetlands at OU-3. The resulting adverse effect on the natural resources comprising the wetland constitutes an injury as defined under 43 CFR 11.14. Site A contained 95% of the 32,000 cubic yards of ACM delineated at OU-3. The majority of the ACM at Site A, and that covering the UAR, had not yet become friable. The ACM contained in Site B was predominantly friable. Two hundred and seven drums were excavated from OU-3. The integrity of the drums ranged from intact to severely compromised. It was determined that several drums had been leaking, others were found empty. Sixty-nine of the drums contained products that were characterized for disposal, 50 of which were later designated as hazardous wastes (IT, 1998).

In 1997, interim response actions for OU-3 were implemented. Debris and drums were excavated and transported to an approved off-site disposal facility. The remaining ACM was later consolidated in 1998 during the remedial phase at Site A, and ecologically immobilized by

capping with a composite synthetic barrier, a fiber erosion control blanket, and 2 feet of compacted fill dirt. The cap was then revegetated with desirable grasses.

This cap is maintained and operated as a grassy meadow dominated by early successional species. The proper functioning of the cap precludes the propagation of later successional species such as shrubs and trees, or restoring the Site A as a wetland. Therefore, the former wetland at Site A has been lost in perpetuity. The adverse effects on the quality and viability of the natural resources comprising the former wetland constitute an injury under 43 CFR 11.14 (v). The grassland now overlying the cap is compatible with other current Refuge management programs. The cap is currently managed as harmoniously as is practical to supplement, and not compromise, the unique character and ecology of the Wilderness Area.

Reclamation of Site B, after remedial actions, incorporated the placement of approximately six inches of organic sediment from borrow areas within Tract 230. The sediments contained a natural seed bank of species indigenous to adjacent wetlands. Further, reclamation produced 3 shallow basins considered to be ecologically more beneficial and productive than the pre-remedial cover type.

Reclamation of the UAR after remedial actions included natural recovery and colonization by adjacent vegetative species or placement of approximately six inches of organic sediment from borrow areas within Tract 230 which contained a natural seed bank of species indigenous to adjacent wetlands. These reclamation activities reestablished the area to pre-contamination condition.

The remediation of OU-3 required the impairment and disruption of 2.42 acres of Tract 230 between 1997 and 1999. The adverse effects on the natural resources on these 2.42 acres constituted an injury resulting from the remedial action. This acreage was used for construction of an anchoring trench around the cap s perimeter, and as staging, parking, and borrow areas. Subsequent reclamation of the 2.42 acres promoted cultivation of pre-remedial vegetation, and a hydrology and topography compatible with adjacent cover types, proper cap function, and other Refuge programs.

In addition to the interim and permanent loss of wetlands and uplands, there was the permanent loss of some length and hydrologic alteration of Great Brook s original channel. The northwestern edge of Site A occupies about 250 linear feet of a meander in the original channel where ACM was placed. Prior to Service ownership of the Dietzman tract, that meander was replaced by a straightened reach aligned about 30-100 feet to the north of Site A, just upstream of the former UAR crossing of Great Brook.

This channel relocation diminished the natural sinuosity of Great Brook and slightly lessened its capacity to store and carry surface water flow. It also slightly reduced Great Brook s natural character, which is a preferred attribute in a National Wilderness Area. Furthermore, the remediation of OU-3 required some additional artificial channel modifications upstream from Site A in order to divert the potentially erosive surface flows away from the Site A cap. That design requirement of the final OU-3 remedy, slightly diminished the natural hydrologic attributes of Great Brook above and below OU-3.

Again, but for the presence of OU-3 , the hydrology of Great Brook would have slightly more of its original attributes, such as more natural sinuosity and greater hydrologic flow. Natural hydrologic characteristics would be preferred in a wilderness area over hydrology that has been altered and has to be managed or manipulated to account for a hazardous waste site.

The area around OU-3 was closed to visitation from May of 1986 to May of 1999 to insure public safety and health, and minimize disturbance while site delineation and remediation activities were conducted. These losses are clearly traceable to the contamination and degradation of natural resources at OU-3.

The natural resource injuries sustained due to the origination, existence, and remediation of OU-3 can generally be described as:

1. the impairment and disruption of natural resource services of 5.58 acres of palustrine wetland and water saturated mixed upland forest (comprised of Site A, Site B, and the UAR), disruption and alteration of the Great Brook channel, including 14 years (1986 to 1999) lost and impaired public access to the Wilderness Area, and loss in perpetuity of 5 acres of palustrine wetland, formerly Site A; and,

2. three years (1997 to 1999) of impaired and disrupted services provided by an additional 2.42 acres of palustrine wetland and water saturated mixed upland forest that were disturbed during the remedial actions at OU-3.

1.3.3 Natural Resources Compensation

Pursuant to NGC's 1993 bankruptcy settlement, the DOI received securities as compensation for natural resource injuries and losses associated with OU-3. Following the sale of these securities, the total amount of funds available for injured resource restoration including planning, implementation, and monitoring, now exceeds $4,500,000 (including accrued interest). By law, the settlement recovery, including interest, can only be used for the restoration, rehabilitation, replacement, or acquisition of equivalent natural resources injured or potentially injured by the OU-3 contamination.

1.4 Public Notification and Review

Under CERCLA and NEPA, Trustees must involve the public in the restoration planning process. To satisfy this requirement, the Service published a Notice of Availability of the draft RP/EA in the Federal Register, and in town newspapers, the Echoes-Sentinel, the Star Ledger, the Chatham-Courier, the Observer-Tribune, and the Daily Record. The draft RP/EA was available for a 30 day public review and comment period beginning January 26, 2000. A copy of the RP/EA was also available for review at the Long Hill Township Public Library, and the Harding Township Town Hall.

Long Hill Township Library
91 Central Avenue
Stirling, New Jersey 07980
(908) 647-2088
Hours: Monday through Thursday, 10 am to 9 pm;
Friday, 10 am to 5 pm;
Saturday, 10 am to 2 pm;
Sunday, 1 pm to 5 pm.

Harding Township Town Hall
Blue Mill Road and Sand Spring Road
New Vernon, New Jersey 07976
Hours: Monday through Friday, 8:30 am to 4 pm.

Interested parties also could have obtained electronic or hard copies of the draft RP/EA from the Service at the following addresses:

New Jersey Field Office
U. S. Fish & Wildlife Service
927 N. Main Street, Bldg D
Pleasantville, New Jersey 08232
Contacts: Clay Stern or Clifford Day
Telephone: (609) 646-9310, Fax: (609) 646-0352.

U. S. Fish and Wildlife Service
Great Swamp National Wildlife Refuge
152 Pleasant Plains Road
Basking Ridge, New Jersey 07920
Contact: William Koch
Telephone: (973) 425-1222, Fax: (609) 425-7309

1.5 Comments on the Restoration Plan / Environmental Assessment

The Service believes that public comment and input is critical to the success of this RP/EA and considered all comments received from the public. When appropriate, the Service made changes to the RP/EA, incorporating concepts and ideas submitted by interested parties during the public comment period. Comments and suggestions received by the Trustee will be addressed in Section 9.0 of this document. The Service requested that comments be made in writing and sent to the following address:

U. S. Fish & Wildlife Service
New Jersey Field Office
927 North Main Street, Bldg D
Pleasantville, New Jersey 08232
Comments may have also been submitted by e-mail to:
clay_stern@fws.gov

2.0 Description of Restoration Alternatives

In developing the RP/EA, NEPA requires that the Service consider a reasonable number of possible restoration alternatives. Although not directly applicable to restoration planning for NRDAR recoveries made without a formal assessment, the NRDAR regulations also provide procedures and criteria for developing and evaluating a reasonable number of restoration alternatives. Section 2.1 explains the criteria for identifying and evaluating alternatives. Sections 2.2 through 2.5 describe each alternative. The preferred and proposed restoration alternative is identified in Section 2.6.

2.1 Criteria for Identifying and Evaluating Restoration Alternatives

The restoration alternatives that are evaluated incorporate the following restoration goals or objectives:

1. restore, replace, or enhance the natural resources and their services lost or impaired as a result of the origination, existence, and estimated effects of OU-3;
2. conserve animal and plant diversity by restoring and protecting natural ecosystems, with particular attention given to the preservation, enhancement, and restoration of viable populations of Federal and State endangered and threatened species; and
3. retain compatibility with other Refuge management plans and goals.

Alternatives considered would restore, rehabilitate, replace, or acquire the equivalent of the injured resources. Unless otherwise indicated, the term "restoration" is used to refer generally

to any and all of these types of actions (i.e., restore, rehabilitate, acquire, etc.). Each of the possible alternatives may consist of actions, individually or in combination, that would achieve those purposes through site-specific projects.

Possible alternatives considered by the Service range from a "no action"/ natural recovery alternative to intensive restoration actions to restore or replace the various resources and services provided by those resources. Possible actions within this range reflect a combination of restoration or rehabilitation management actions and needs and opportunities for resource replacement or acquisition.

Drawing upon the factors listed in the NRDAR regulations for selecting a restoration alternative, the Service is evaluating each of the possible alternatives based on all relevant considerations including the following factors:

1. technical feasibility;
2. relationship of the expected costs of the proposed actions to the expected benefits from the restoration action, including amount of desirable functions restored, benefit to the surrounding watershed, and benefit to the public (e.g., access, quality of use and enjoyment, user groups affected);
3. cost-effectiveness;
4. results of the response actions for OU-3;
5. potential for additional injury resulting from the proposed actions, including long-term and indirect impacts, to the injured resources or other resources;
6. natural recovery period;
7. ability of the resources to recover with or without alternative actions;
8. potential effects of the action on human health and safety;
9. consistency with relevant Federal and State policies; and,
10. compliance with applicable Federal and State laws.

Additionally, the Service considered the relative proximity of the action to OU-3 when evaluating possible alternatives.

The restoration alternatives described herein are based on conceptual plans for which the costs have not been calculated in detail. The size and design of recommended restoration alternatives may change substantially based on public input or additional scientific findings. If, during implementation, the Service determines that significant changes are appropriate to the selected restoration alternative, or if the amounts of funding described in this plan are shifted significantly among the various components of the selected alternative, additional public review and comment will be sought and the RP/EA amended as appropriate. No restoration activities will be conducted by the Service that would incur ongoing expenses in excess of

those that can be funded by settlement monies or the interest therefrom, unless such additional monies are allocated through the normal budget process.

2.2 Alternative A: No Action / Natural Recovery

This alternative is addressed to fulfill requirements under NEPA, and is consistent with the damage assessment process under the NRDAR regulations. Under Alternative A, no action would be taken to restore resources injured due to contamination at OU-3 or to replace or acquire additional natural resources to restore ecological and human services provided by the injured resources. The funds recovered for DOI s natural resource damages claim for the site would not be spent. Restoration of the resource and resource function would be completely dependent upon natural processes. This alternative is technically feasible, has no cost, but also would result in no benefit from the funds specifically recovered from NGC for restoration, and for that reason is not considered a cost-effective alternative to the extent cost-effectiveness can be analyzed.

Because the response action capping Site A at OU-3 has displaced in perpetuity the former wetlands at that site, this alternative would do nothing to offset injuries resulting from the contamination and results of response actions. No additional natural resource injuries would be caused by this alternative, but injuries and losses resulting from OU-3 would go unaddressed. This alternative would have no effect on human health and safety. It is, however, inconsistent with both Federal and State policies to restore natural resources injured by hazardous substances, and is inconsistent with CERCLA s requirement that funds recovered by Trustees for natural resource injuries be spent on restoration or replacement of those resources.

2.3 Alternative B: On-site, In-kind Restoration at OU-3

When developing and evaluating restoration alternatives, the Service weighed an alternative to restore natural resources in-kind and at the same location as the injury. This alternative considers restoration on-site (OU-3 exclusively). The remedial activities on the former Site A within OU-3, specifically the capping, precludes further topographic, hydrodynamic, or vegetative alterations to the cap, other than those prescribed in OU-3's Operation and Maintenance Plan (IT, 1999). Given these circumstances, the Service has not identified any restoration actions at Site A that would not deleteriously affect the proper functioning of the remedial action. As part of remedial activities, reclamation of the former Site B and UAR promoted recurrence of desirable pre-contamination vegetation and hydrology on both areas. Further ecological manipulation to facilitate or expedite restoration or enhancement of the former Site B and UAR is not warranted. As a result, no active on-site restoration actions were identified under this alternative, and the evaluation of the selection criteria is unnecessary.

2.4 Alternative C: Off-site, In-kind Restoration

Alternative C, off-site, in-kind restoration, comprises several actions considered in a manner to maximize the potential for sustainable restoration success and minimize risks associated with unforeseen and uncontrollable complications (e.g., drought, floods, fire, disease, or other natural variables). All of the actions considered under this alternative are technically feasible, and will be conducted in a cost-effective manner. All actions under this alternative presume that the effects of the remedial actions at OU-3 will remain substantially as they are currently, that further restoration or enhancement actions as Site B and the UAR are unnecessary, and that the capped landfill at Site A will preclude in perpetuity any ability to restore wetlands on that site, whether through natural or human processes. Therefore, this alternative is based on a determination that the natural resources injured at OU-3 will not recover to baseline condition and the services they provided will not be restored without taking alternative off-site actions. All component actions of this alternative would be implemented within the Great Swamp watershed. Specific actions to be addressed under Alternative C follow.

2.4.1 Replacement of Lost Resources and Acquisition of Additional Resources

This action replaces lost resources and the services provided by those resources or acquires additional natural resources. This action replaces natural resources, and the services they provided, lost at OU-3 by restoring, rehabilitating, or enhancing properties to be included under ownership by the GSNWR. Protection in perpetuity would thereby be bestowed to the acquired and restored natural resources and the services provided by those resources.

Implementation of this action would allow for the acquisition of property, either a single parcel or the combination of multiple parcels, within the approved acquisition boundary of the GSNWR or eligible under other Refuge acquisition programs. In deciding whether to acquire and restore properties under this action, the Service will have evaluated properties using the following criteria:

1. potential and extent for cost-effective and technically feasible restoration activities;
2. amount of natural resources or ecological services similar to those injured or lost at OU-3 currently existing, or which can be restored, replaced, or enhanced;
3. relative proximity to OU-3;
4. ecological value of the land;
5. other protections currently afforded the land (i.e., protection under New Jersey s wetlands regulations or other applicable laws or regulations) which could lessen the importance of protection under the refuge system; and,
6. historic and current land uses, development potential, and need for protection.

Upon inclusion of the purchased land into the GSNWR, restoration activities would be undertaken to ensure that functional, sustainable, and desirable wetlands or other cover types, similar to or providing the same functions and services as the wetlands and upland forest injured or lost at OU-3 are established. Restoration actions may range from promotion of natural succession to intensive management by vegetative, hydrological, or topographical manipulations, and removal of buildings or other artificial structures. It is anticipated that public access to the acquired properties generally will be regulated commensurate with Refuge management objectives. No trail construction is planned for these acquired properties as part of this action, although it is possible that a particular property could serve as an access point for existing trails.

This action would also allow for the acquisition of properties which provide equivalent resources and similar services as those provided by OU-3 prior to contamination, or acquisition of properties containing resources with the potential for protection, buffering, or otherwise supporting the ecological development, function, or sustainability of existing habitat within the GSNWR or the surrounding watershed.

All properties considered under this action will be evaluated on a case-by-case basis to determine the suitability of the property for meeting the needs of restoration set forth in the RP, and evaluated under the above criteria.

This action serves to replace and increase the wetland and ecological resources and services lost in perpetuity due to the origination, existence, and remediation of OU-3. Among other things, this action has the potential to preserve, protect, and maintain the ecosystem s assimilative capacity thereby directly and indirectly enhancing the quality of surface waters entering the GSNWR, services provided by the former natural resources of OU-3.

Estimating costs for any restoration action, including the costs of land acquisition, is complicated by several factors. These factors include the cost of reestablishing a desirable vegetative community and hydrology (e.g., labor, equipment rental, vegetative enhancement, installation of temporary water control structure, etc.), parcel availability, size, and location, the parcel s development or commercial potential, current zoning, and market value. There is considerable public concern to conserve open space and decelerate the rapid suburban sprawl in the Great Swamp Watershed, and this restoration action has the added benefit of being consistent with these concerns. The Service is proposing to allocate approximately $3,000,000 toward the replacement of lost resources and the acquisition and restoration of additional resources. Acquisition of properties for inclusion within GSNWR and restoration of those properties is consistent with Federal and State policies and laws promoting the conservation and protection of fish and wildlife resources. As parcels are identified and restoration implementation plans are developed, additional information on those parcels and plans will be publically available.

2.4.2 Restoration by Management of Invasive Plant Species

This action employs a biological control methodology (selected European beetle species) to suppress and control purple loosestrife (*Lythrum salicaria*) in Management Pools 1 & 2, and mechanical, chemical, or biological methods to management densities of other invasive plant species. Although the infestation of purple loosestrife into Management Pool 1 began prior to remedial actions at OU-3 in 1997, the necessity to maintain low water levels in the pool to facilitate drainage of OU-3 during remedial activities favored and accelerated the spread of this invasive plant. This action involves propagation, maintenance, and monitoring of beetle populations within Management Pools 1 & 2 with the specific objective of suppressing and controlling purple loosestrife density to favor growth and perpetuation of desirable native flora. The net benefit of this restoration action would be reduction and control of an invasive plant, and restoration of more than 400 acres of wetlands within Management Pools 1 & 2, with potential to further suppress purple loosestrife in other parts of the Refuge and the adjacent watershed.

Further, in order to restore and maintain the integrity of the wetland ecological communities within the GSNWR, the Service has included in this action intensive management of other invasive plants species. Invasive plant species under consideration by this action include, but are not limited to, garlic mustard (*Alliaria petiolata*), Japanese barberry (*Berberis thunbergii*), and mulitflora rose (*Rosa multiflora*). Control techniques will include, but are not limited to, mechanical, chemical, and biological methods applied commensurate with the desired impact on the density of the invasive species being treated.

Based on similar actions and past Refuge experience, the Service is considering allocating $300,000 over an estimated five year period to acquire, propagate, and deploy beetles, establish beetle populations to a level of self-sustainment, and evaluate the efficacy of the various beetle species to suppress purple loosestrife densities and apply appropriate control measurers to other invasive plant species. The Service believes the expected cost of controlling invasive plant species is justified by the long-term benefits that will be provided. A robust monitoring protocol will be included in the action to evaluate beetle survivability and impacts to purple loosestrife, and to determine whether additional funds from the NGC recovery should be allocated or other corrective action taken to meet the objectives of this action. The periodicity and total number of years of required monitoring is variable and may be dependent on climatic and ecological variables (e.g., flooding, disease, drought) and interpretation of new scientific findings.

In addition to the evaluation and selection criteria discussed above, this action is expected to have a beneficial impact on native natural resources of the kind injured or lost at OU-3. It is not expected to have a negative impact on human health and safety. Finally, it is consistent

with Federal policies regarding the control of invasive species (Executive Order 13112 (Invasive Species), Feb. 3, 1999).

2.4.3 Enhancement of Precipitation-dependent Vernal Wetlands

This action is designed to enhance precipitation-dependent vernal wetlands located within the GSNWR, similar to those existing at OU-3 prior to contamination. Vernal wetlands are regularly saturated or retain water during the spring of the year. This type of wetland provides important habitat for brooding waterfowl and other wetland species such as the State-listed blue-spotted salamander. This action includes potential topographic, hydrologic, soil and vegetation surveys of the area(s) of interest prior to enhancement activities, and a monitoring and corrective action program designed on a site-specific basis to evaluate the success of this action and to determine whether additional action is needed to achieve the restoration objective.

Under this action, the area(s) of interest, would be topographically restored and enhanced to favorable moist soil conditions. Further enhancement activities may include excavation and maintenance of shallow precipitation retention basins for the benefit of wildlife and enhanced wildlife observation commensurate with designated Refuge public access, manipulation of the canopy density in areas of historical bog turtle habitat within the GSNWR boundaries, installation or modification of water control structures and removal of undesirable buildings from the property. This action replaces similar ecological services (e.g., brooding and nesting habitat, the wetland s assimilative capacity, surface water retention) as those lost, degraded, disrupted, or impaired due to contamination or remediation of OU-3. Based on similar actions and past Refuge experience, the Service is considering allocating $200,000 to implement this action.

2.4.4 Protection and Enhancement of Off-Refuge Wetlands

This action involves Service support through cost-sharing with the local communities on specific projects to encourage acquisition, restoration, rehabilitation, or enhancement of wetlands within the Great Swamp Watershed, outside the jurisdiction of the GSNWR. The objective of this action is to replace, enhance, or add to the wetland ecological services lost by the origination, existence, and remediation of OU-3 through off-Refuge projects. The mechanisms that the Service intends to use for this action are grant agreements or cooperative agreements, as appropriate, with local public or private entities whose restoration projects are selected by the Service. This action aids in buffering and curbing the environmental impacts associated with rapid suburban development (e.g., increased amounts of impervious cover, road run-off, and toxicant deposition; reduced groundwater recharge; loss of wildlife habitat) within the watershed and adjacent to approved GSNWR acquisition boundaries. This action also has the potential to preserve, protect, and maintain the quality of surface waters (a service provided by the natural resources at OU-3 prior to contamination) entering the GSNWR, and promotes

cooperation between the Service and local communities to mutually preserve and conserve the resources of the Great Swamp Watershed. Service participation in any approved off-refuge action will be commensurate with the allocated funding, the objectives of the action, the potential for beneficial or adverse impacts to the GSNWR, and will be considered on a project-specific basis.

As part of this action, the Service would periodically (e.g., annually) request proposals, or otherwise identify potential qualifying projects. Prospective site-specific projects would be evaluated on a case-by-case basis to determine the potential and necessity for cost-effective restoration, and the suitability of the project for meeting the needs of restoration set forth in the RP. As sites are identified and restoration implementation plans are developed, public review and comments will be sought. The Service would reserve the discretion not to fund any projects in a given year if it is determined, after consultation with local communities, that waiting for future projects and opportunities would be more beneficial. For prospective site-specific projects to be considered under this action, the following criteria will be met:

1. project will benefit the GSNWR by restoring, replacing, enhancing, or protecting natural resources, and the services they provide, similar to those lost , impaired, disrupted or degraded due injuries at OU-3;
2. project will located within the Great Swamp Watershed;
3. project will be cost-effective;
4. other funding sources have been exhausted; and,
5. properties on which projects are conducted are or will be protected in perpetuity by an enforceable arrangement such as a conservation easement, deed restriction, or other enforceable agreement.

Commensurate with historical opportunities presented to the GSNWR by local communities, the Service believes that initially allocating $350,000 to implement this action would be appropriate as a means to support and integrate off-refuge ecologically beneficial actions in the surrounding communities with the on-Refuge restoration actions.

2.4.5 Replacement of Lost Public Access and Visitor Participation in Natural Resource Restoration and Protection

This action is designed to provide enhanced public access to Refuge resources in conjunction with existing facilities to replace the lost public use due to the closure of trails at OU-3 between 1986 and 1999, and to educate Refuge visitors about how their actions can help protect and preserve natural resource such as those injured at OU-3. Rather than develop new trails on the properties acquired and restored to functioning wetland and related habitat under this alternative, the Service is proposing to extend and enhance public access at an existing trail site.

This action would involve the renovation, and extension of the Wildlife Observation Center boardwalk. The existing 540 feet of boardwalk, originally built in the mid 1970's, requires repair to ensure the safe passage of the public. In addition, as shown in the GSNWR Master Plan (USFWS 1987) the board walk loop needs to be extended approximately 2000 feet. An important component of this action would be the development of exhibits or educational materials for users of the boardwalk, intended to enhance the public s appreciation of the Refuge resources and to teach people how their actions can help promote the restoration, protection, and preservation of natural resources such as those injured at OU-3 (e.g., recycling mercury-containing batteries; recycling lead-containing computer monitors; avoiding actions that could degrade wetlands or taking actions that can enhance wetlands). The cost of renovating and extending the boardwalk, and developing and providing educational exhibits or other materials has been estimated at approximately $500,000. The net benefits of this action is the replacement of lost public use and access due to contamination at OU-3, providing the public with educational tools to be partners in resource protection, and enhancing the quality of public visitation to the Refuge while minimizing human disturbance to the natural resources.

The extension the boardwalk will inevitably require some disturbance of wetland resources compared to conditions that currently exist. However, the elevated nature of the boardwalk helps minimize future disturbance of the ecosystem. The action will not have an adverse impact on human health and safety, and in fact the renovation of the existing boardwalk will enhance public safety. Finally, the proposed action is consistent with Federal law and policy to recognize and provide opportunities for compatible wildlife-dependent recreational uses of the Refuge through which the American public can develop an appreciation for fish and wildlife. The Service is proposing allocating approximately $500,000 toward this action.

2.4.6 Conversion of former residential or commercial sites to desirable cover types

Under this action, several former residential or commercial sites dominated by exotic and invasive plant species, held as part of the GSNWR, would be restored to cover types consistent with, harmonious to, or beneficial to adjacent desirable cover types, thereby restoring or replacing natural resource injured or lost at OU-3. Undesirable structures (outbuilding, houses, stables), fencing, debris, or other incompatible infrastructure (e.g., pavement, berms, storage tanks, water control structures) located on the former residential or commercial site would be removed and legally disposed. The former residential or commercial sites will then be topographically, hydrodynamically, or vegetatively enhanced to promote production of desirable and sustainable cover types.

Sites for consideration under this action will be evaluated based on the following:

1. predicted ecological communities to be generated as a result of the restoration actions are similar to, or ecologically support the natural resources or services injured or lost at OU-3;

2. extent of current degradation to former ecological community at a site under consideration;
3. existing hydrology, topography and ecological communities in juxtaposed properties;
4. the technical feasibility of the action:
5. cost benefit relative to the injured natural resources; and,
6. absence or insufficiency of other Refuge funds or assets to complete a similar restoration action at a given site in a timely manner.

This action, when implemented, replaces natural resources and services formerly afforded by OU-3 prior to contamination including providing suitable food and cover for wildlife and, ecologically desirable hydrological characteristics and functions (e.g., water conveyance and filtration, flood control, drinking water for wildlife, propagation of ecologically desirable flora) of emergent and forested wetlands. Further, this action facilitates restoring the assimilative capacity to the former residential or commercial sites by removal of impervious cover (i.e., pavement, cement, dilapidated structures), promoting favorable landscape contours and hydrology, and fostering propagation of desirable vegetative cover. Moreover, the action serves to restore highly disturbed ecological communities by removal of exotic (ornamental grasses, shrubs, and trees) and invasive plant species, and actively managing for the proliferation of desirable and native plant communities similar to those injured or lost at OU-3.

Several former residential or commercial sites have been identified, totaling approximately 20 acres, by the Service for possible inclusion under this action. Based on past GSNWR experience, the Service is proposing to allocate $150,000 to this action.

2.5 Alternative D: Off-site Out-of-kind Restoration

Under Alternative D, off-site out-of-kind (e.g., riparian, grassland, or dry upland forest natural resources) restoration actions in the vicinity of the loss would be considered. Such off-site, out-of-kind actions would still have to be beneficial, whether directly or indirectly, to the types of resources injured at OU-3. Within the vicinity of the areas of contamination, the majority of out-of-kind natural resources are already held in perpetuity by the Service or are offered similar protection by virtue of municipal ownership, and are managed to optimize their ecological and social potentials.

Given that a reasonable number of in-kind restoration actions are feasible, and the absence of out-of-kind restoration actions having sufficient scope and magnitude to compensate the public within the vicinity of the loss, the Service has determined that further pursuit of Alternative D is not warranted. No specific actions meeting criteria set forth in Section 2.1 were identified by the Service.

2.6 Preferred Alternative

The preferred alternative identified by the Service is Alternative C: off-site, in-kind restoration. The Service selected this alternative as it was determined that restoration activities at OU-3 were either undesirable or unwarranted by virtue of remedial actions. Therefore, the off-site, in-kind alternative provided a vehicle which could expedite, in a cost-effective and technically feasible fashion, the restoration, rehabilitation, or other replacement of similar resources which existed at OU-3 prior to contamination, and provide them with long-term protection. The proposed actions under this alternative are further discussed in Sections 3.3 and 4.0 of this document.

3.0 Environmental Consequences of Restoration Alternatives

Addressing the potential effects of restoration alternatives is required under NEPA. Section 3.0 discusses the potential benefits and consequences of each alternative, and the actions contained therein.

For any restoration actions considered, the potential to affect cultural resources, such as prehistoric and historic resources, Native American remains and cultural objects, will be determined early in project planning. To this end, the procedures in 36 CFR 800 implementing Section 106 of the National Historic Preservation Act of 1966, as amended (16 U.S.C. 470 *et seq.*), requirements of the Native American Graves Protection and Repatriation Act of 1990, as amended (25 U.S.C. 3001 *et seq.*), and policies and standards specified in the Fish and Wildlife Service Manual 614 FW 1-5 will be achieved.

3.1 Effects of Alternative A: No Action / Natural Recovery

Under the no action / natural recovery alternative, injuries to natural resources (e.g., destruction of natural resources comprising a wetland) and the resulting loss of services would be not be addressed. This alternative assumes that given sufficient time, natural processes would recover to pre-injury status; however, the selected remediation of OU-3 (capping) proscribes wetlands ever recurring at Site A. No environmental benefits would be realized from the settlement with NGC, which is the monetary compensation recovered on behalf of the public, and which CERCLA requires be spent only on restoring or replacing the injured natural resources.

3.2 Effects of Alternative B: On-Site, In-kind Restoration

Under Alternative B, on-site (OU-3 exclusively) restoration of in-kind resources were considered. The remedial activities on the former Site A within OU-3, specifically the capping, precludes further topographic, hydrodynamic, or vegetative alterations to the cap, other than those prescribed in OU-3's Operation and Maintenance Plan (IT, 1999). The Service has

determined that restoration actions at OU-3 would deleteriously affect the proper functioning of the remedial action and should not be pursued. As part of remedial activities, reclamation of the former Site B and UAR promoted reoccurrence of desirable pre-contamination vegetation and hydrology on both areas. Further ecological manipulation to facilitate or expedite restoration or enhancement of the former Site B and UAR is not warranted. Therefore, this alternative is not technically feasible and would be inconsistent with the selected remedial action at OU-3.

3.3 Effects of Alternative C: Off-Site, In-kind Restoration

Alternative C evaluates off-site, in-kind restoration actions.

3.3.1 Replacement of Lost Resources and Acquisition of Additional Resources

This action replaces lost resources or provides additional resources and the services they provided by acquisition and inclusion of land into the GSNWR. Such land will have the potential for restoration, rehabilitation, enhancement, production, or creation of functional and sustainable wetlands. Further, selected lands may contain desirable natural resources possessing the potential for protection, buffering, or otherwise supporting the ecological development, maturation, function, or sustainability of desirable wetlands and the surrounding watershed. Finally, this action facilitates buffering environmental impacts associated with rapid suburban development (e.g., increased amounts of impervious cover, road run-off, and toxicant deposition; reduced groundwater recharge; loss of wildlife habitat) within the watershed and adjacent to the current GSNWR boundaries.

The consequence of this action is the preservation and conservation in perpetuity of open space, a rapidly vanishing and valuable natural resource of Morris County, New Jersey. The ecological services provided by such lands (e.g., wildlife habitat, intrinsic values, flood water control) will also bestow protection in perpetuity. Another consequence of this action is that any land acquired by the Service will no longer be available for commercial, residential, or economic development (potentially elevating the market value of other properties in the area), and acquired land will be exempt from collection of local and State property taxes. However, land acquired by the Service is subject to regulations under the Refuge Revenue Sharing Act of 1935, whereby funds from revenue-producing activities on Federal conservation lands are distributed to counties or municipalities to offset the loss of property tax revenues.

The cost of this action is commensurate with current real estate market values, locality, availability of willing sellers and parcel size, development potential and availability. Consideration of parcel-specific costs compared to the benefits that may be realized through its acquisition will be made on a parcel-specific basis as properties become available. Acquisition of property and associated restoration actions are not expected to create any potential for

causing additional injury to the natural resources at OU-3 or other natural resources. In addition, acquisition is not expected to have any adverse impact on human health and safety. It is the intent of the Service to maximize the benefits in relation to the cost of acquiring desirable properties for inclusion to the Refuge. The necessity and magnitude of restoration activities and costs required to achieve management objectives will be determined on a site-specific basis.

3.3.2 Wetlands Restoration by Invasive Species Control

This action employs a biological control methodology (selected European beetle species) to suppress and control purple loosestrife in Management Pools 1 & 2, and various mechanical, chemical, and biological control methods to curb the densities of several other invasive plant species in other parts of the GSNWR. The specific objective of this action is to suppress and control undesirable invasive plant species to non-deleterious levels, allowing the recolonization and propagation of desirable vegetative communities similar to those lost or injured at OU-3.

The predicted and desired consequence of this action is the reduction and control of a noxious plant species, and the rehabilitation and propagation of desirable plant species within Management Pools 1 & 2. The introduction and propagation of exotic beetle species for biological control of purple loosestrife in other parts of the United States has proven cost effective and successful. This form of biological control has not generated adverse ecological consequences in the areas where it has been applied, and is considered a safe and effective alternative to chemical control methods (BOR, 1999). This action includes an intensive monitoring program over the life of the action to evaluate the effectiveness of the prescribed biological control method, and determine whether mid-course corrections are necessary to achieve the restoration objectives.

3.3.3 Enhancement of Precipitation-dependent Vernal Wetlands

This restoration action is designed to enhance existing or historic precipitation-dependent vernal wetlands within the GSNWR. Under this action, Refuge-held property would be topographically and hydrodynamically enhanced for desirable and beneficial moist soil management. Additionally, when desirable, shallow precipitation retention basins would be excavated and maintained replacing the resources and services provided by similar basins at OU-3 prior to contamination. Consequences of this action include production or enhancement of brooding habitat for waterfowl and other wetland-dependent wildlife including the blue spotted salamander, wood turtle, and bog turtle. Other social or economical consequences (e.g., loss of tax revenue, alterations to traffic patterns, increased stresses on existing Refuge

facilities) are minimized or non-existent because properties covered under this action are already held in Service trust. Further, restoration or enhancement projects carried out under this action would be engineered and managed for beneficial water conveyance away from adjacent privately-held properties, mitigating off-site consequences this action.

3.3.4 Protection and Enhancement of Off-Refuge Wetlands

This action involves Service support through funding to the local communities to encourage the acquisition, restoration, rehabilitation, or enhancement of wetlands within the Great Swamp Watershed, outside the jurisdiction of the GSNWR. The objective of this action is to replace, enhance, or add to the wetland ecological services lost by the origination, existence, and remediation of OU-3 through off-Refuge projects. This action will be implemented through grant agreements or cooperative agreements for selected projects. An intended consequence of this action is to facilitate buffering the impacts of rapid urban development (e.g., increased amounts of impervious cover, road run-off, and toxicant deposition; reduced groundwater recharge; loss of wildlife habitat) within the watershed and adjacent of the approved refuge acquisition boundaries. Further consequences of this action are the preservation, protection, and maintenance of surface water quality, and promote cooperation between the Service and local communities to mutually preserve and conserve the natural resources of the Great Swamp Watershed.

This action has the potential consequence of impairing, hindering, or halting commercial, residential, or economic development by making property unaccessible, unavailable or undesirable for those uses. Additionally, zoning or easements on properties resulting from this action may be exempt from collection of local and State property taxes. The Refuge Revenue Sharing Act of 1935 would not apply under this action because property acquired by this action would not be deeded to a Federal conservation agency.

3.3.5 Replacement of Public Use Benefit

This action would involve the renovation and extension of the GSNWR Wildlife Observation Center boardwalk to replace lost public use due to contamination at OU-3. Pursuant to implementation of this action, the Refuge may experience increased visitor foot and road traffic, compelling increased staff time to ensure safe public passage consistent with current GSNWR management plans. A designed consequence of this action is to minimize the impact of public use to natural resources by actively managing public access area, thereby improving the quality and safety of public visitation to the GSNWR. This action also serves to increase

and enhance public access to the GSNWR for walking and the pleasures of wildlife observation.

3.3.6 Conversion of former residential and commercial sites to desirable cover types

Under this action former residential and commercial sites, held as part of the GSNWR, would be restored to vegetative cover types consistent with, harmonious to, or beneficial to adjacent desirable vegetative cover types. The designed consequence of this action is to place the former residential and commercial properties back into desirable, functional, and sustainable vegetative cover types, which would include, but would not be limited to, wetland and forested upland cover types similar to that injured at OU-3. A beneficial consequence included within this action is the removal of dilapidated structures and other impervious cover (e.g., pavement, cement) from the GSNWR. Currently these structures are a liability to the Service, because they fragment and impair habitat, compromise the ability of the natural resources at the site to provide services such as those lost or injured at OU-3, and are an eyesore to the public. Since the properties affected under this action are owned and managed by the GSNWR, there would be no foreseeable adverse consequences to local property tax collection or change of land use. When implementing this action, topographic or hydrological changes to the former residential or commercial sites will be designed and carried out in such a manner as to remove or negate any adverse impact to adjacent or nearby privately or publically held properties.

3.4 Effects of Alternative D: Off-Site, Out-of-Kind Restoration

No specific actions were identified for this alternative.

4.0 Selected Alternative

The selected alternative, Alternative C: off-site, in-kind restoration, consists of a combination of actions that would restore, rehabilitate, and replace the injured resources. The proposed actions use an integrated wetlands management approach intended to maximize restorations effects and minimize unforeseen losses to natural forces such as drought, floods, disease, or impacts from wildlife grazing.

To address the natural resource injuries at OU-3 discussed in Section 1.3.2, the objectives of the selected alternative are to:

1. replace wetlands lost in perpetuity at OU-3;
2. restore, rehabilitate, enhance, or protect wetlands and the wetland services which are the same or similar to those provided at OU-3; and,

3. replace human-based services (public access) lost due to contamination at OU-3, in a manner that supports and complements natural resource restoration and protection.

In order to achieve the above stated objectives, the Service proposes the following actions contained within the selected alternative:

1. replace and protect in perpetuity wetlands via land acquisition and restoration;
2. restore or rehabilitate wetlands via intensive biological, mechanical, and chemical control of invasive plant species;
3. restore vernal wetlands within the GSNWR via a range of management tools;
4. promote restoration and protection of wetlands outside the GSNWR by cost-sharing with local municipalities or other interested organizations; and,
5. replace lost public use by enhancing GSNWR public access facilities and develop educational tools to foster resource protection and preservation.

The selected alternative includes an action designed to replace wetlands lost in perpetuity at OU-3. Land located within the approved Refuge acquisition boundary or qualifying for acquisition, and preferably having low habitat value (i.e., agricultural land or otherwise cleared land) would be acquired and converted or restored to desirable, functional, and sustainable wetlands. A comprehensive land acquisition practice by the GSNWR has historically been advocated by local municipalities and received considerable public support. Public support for continued Refuge expansion has repeatedly been expressed, and the number of willing land sellers often exceeds available acquisition funding. Further, the Service has determined that given the intensive suburbanization of the Great Swamp Watershed, land acquisition is the most cost-effective and beneficial action capable of protecting the investment in existing trust resources (e.g., the Refuge, local parks and open space, surface waters, fish and wildlife habitat) held by the Service or other Trustees. This action expedites restoration, replacement, and enhancement of lost resources and services associated with OU-3. Upon acquisition of properties, the Service will commence to restore, rehabilitate, enhance and protect in perpetuity wetlands on those properties as functional and sustainable components of the GSNWR. Public access generally will be restricted commensurate with GSNWR management objectives, and no trail construction on these acquired properties is planned as part of this action.

An action within the selected alternative implements an intensive biological, mechanical, and chemical control of invasive plant species, with particular emphasis placed on purple loosestrife, expediting the restoration and rehabilitation of wetlands in the vicinity of OU-3. Currently, the Service is using a biological control to purple loosestrife within the GSNWR. Successful purple loosestrife control efforts have been hindered by unusual flooding conditions impeding the establishment of an indigenous breeding population of beetles. The Service

intends to purchase, release, nurture, and monitor beetles (three different species) which exclusively feed on specific parts of the purple loosestrife plant (e.g., leaf, root, flower). Commensurate with the suppression and control of purple loosestrife, the GSNWR would continue to institute management practices promoting the production of beneficial vegetation in Management Pools 1 and 2. The net benefit realized would be the restoration and rehabilitation of more than 400 acres of wetlands containing desirable flora, reestablishment of the full potential of ecological services provided by the Management Pools, and sustainable control of invasive plant species. Additional management actions (e.g., mechanical removal, herbicide application, biological control) would be employed to suppress the density of invasive plant species (i.e., garlic mustard, multiflora rose, Japanese barberry) on the Refuge, and promote propagation of desirable plant communities similar to those lost or injured due to contamination at OU-3.

Another action contained in the selected alternative is the restoration of vernal wetlands within the GSNWR via a range of management tools. This action will include vegetative, topographic, and hydrodynamic manipulations, removal of buildings, and regulated public access to enhance precipitation-dependent vernal wetlands within the GSNWR. Implementation of such management actions will replace ecological services lost due to contamination or remediation of OU-3.

A further action contained in the selected alternative promotes restoration and protection of wetlands outside the GSNWR by cost-sharing with local municipalities or other interested organizations through grant agreements or cooperative agreements for selected projects. The Service will provide funding, consistent with applicable laws and regulations, to local projects that satisfy criteria included in the RP and that acquire, restore, rehabilitate, or enhance wetlands within the Great Swamp Watershed, outside the jurisdiction of the GSNWR. This action will assist in replacing the wetland ecological services lost by the origination, existence, and remediation of OU-3. This action will facilitate buffering the impacts of the rapid urban development (e.g., increased amounts of impervious cover, road run-off, and toxicant deposition; reduced groundwater recharge; loss of wildlife habitat) within the watershed and adjacent of the approved refuge acquisition boundaries, has the potential to preserve, protect, and maintain the quality of surface waters entering the GSNWR, and promotes cooperation between the Service and local communities to mutually preserve and conserve the resources of the Great Swamp Watershed.

Finally, an action is contained in the selected alternative which replaces lost public use via enhancing GSNWR public access with an educational component to enhance visitor appreciation of Refuge resources and to inform and educate the public how they can assist in

protecting and conserving natural resources of the type injured at OU-3. Under this action, the boardwalk trail at the Wildlife Observation Center would be extended up to a half-mile to form a complete loop-trail. The net benefit of this action is the replacement of lost access and public use due to contamination at OU-3, and the development of educational tools designed to promote public protection and conservation of natural resources.

The Service believes that the aforementioned actions contained within the selected alternative represent cost-effective, practical and beneficial means by which to restore or replace the natural resources injured and the services they provided due to the origination, existence, and remediation of OU-3. All work plans, including any additional NEPA analysis developed for implementation of specific actions will be publically available. A summary of the proposed allocation of restoration funds for the selected alternative is found in Table 1.

Table 1. Proposed Restoration Fund Allocation for the Selected Alternative

Proposed Actions within Alternative C: Off-site, In-kind Restoration	Proposed Allocation
Replacement of Lost Resources and Acquisition of Additional Resources	$3,000,000
Restoration by Management of Invasive Plant Species	$300,000
Enhancement of Precipitation-dependent Vernal Wetlands	$200,000
Protection and Enhancement of Off-Refuge Wetlands	$350,000
Replacement of Lost Public Access and Visitor Participation in Natural Resource Restoration and Protection	$500,000
Conversion of former residential or commercial sites to desirable cover types	$150,000
	$4,500,000

5.0 Monitoring and Corrective Action Plan

A monitoring and corrective action plan will be an integral part of each specific restoration action contained within the selected alternative. The specific restoration actions presented in this draft RP/EA will be biologically monitored (plant survival in restored / enhanced habitats and faunal responses) and maintained (replacement of unsuccessful plants, erosion control, cleaning / repair of water structures, temporary fencing for deer control, trail repairs, curtail

succession, etc.) when necessary. Evaluation techniques, time tables, and allocation of funding for the monitoring and corrective action portion of any action will considered to be site- and action-specific, and publically available as developed.

6.0 State Concurrence

The natural resources injured at OU-3, part of the Great Swamp Watershed ecosystem, are subject to overlapping Trusteeship of both the United States and the State of New Jersey. Therefore, while the NGC settlement was obtained by the United States, the Service will seek State concurrence as a co-trustee for the final restoration plan.

7.0 List of Preparers

This RP/EA was prepared by the Service's New Jersey Field Office (NJFO) in close coordination with GSNWR. Critical review of this document during its preparation was provided by the respective staffs of the NJFO and GSNWR, the Service s Regional and Washington Offices, and the DOI s Office of the Solicitor. Other reviews and ideas for restoration alternatives were provided by many interested parties.

8.0 List of Agencies, Organizations, and Parties Consulted for Information

New Jersey Field Office, U. S. Fish & Wildlife Service
Great Swamp National Wildlife Refuge, U. S. Fish & Wildlife Service
Regional Office (R-5), Hadley, MA, U. S. Fish & Wildlife Service
Division of Environmental Contaminants, U. S. Fish & Wildlife Service
Robert Burr, U. S. Department of the Interior
Harding Environmental Commission
Harding Land Trust
Paul Fox, Apgar Associates, Harding, New Jersey
Paul Lupini, Amy Green Environmental Consultants
Office of the Solicitor, Department of the Interior

9.0 Responses to Comments

Comments and suggestions received as a result of public review of this draft RP/EA are addressed in this section. The Service received 6 written comments during the public review period.

Comment: One responder suggested the utilization of a portion of the proposed allocation to offset costs associated with the remediation of the Harding Landfill Site.

Service response: Under CERCLA, monies recovered as natural resource damages may be used only to restore, replace, or acquire the equivalent of [the] natural resources [injured by the hazardous substance release]. CERCLA section 107(f)(1), 42 U.S.C. 9607(f)(1). As such, the natural resource damages recovered for OU- 3 can only be used for natural resource restoration, and not to fund or offset the cost of remedial activities at the Harding Landfill Site. This statutory requirement also precluded the DOI from using the OU-3 recovery to fund or offset the cost of the remedial activities conducted at the OU-3 site.

Comment: Two responders advocated acquiring more land for the GSNWR and utilizing a portion of the monies to conduct research or implement birth control methods as an alternative to hunting.

Service response: The Service has selected an alternative which contains a robust land acquisition component for the replacement of lost resources and acquisition of additional resources. The natural resource damages recovered for OU- 3 can only be used for natural resource restoration, and not to fund research or address management practices not related to the injuries at OU-3 (CERCLA section 107(f)(1), 42 U.S.C. 9607(f)(1)). This includes, for example, wildlife contraceptive methods.

Comment: One responder encouraged the Service to pursue land acquisition and identified several parcels for consideration.

Service response: The Service has selected a preferred alternative which contains a progressive land acquisition component for the replacement of lost resources and acquisition of additional resources. The Service will consider the suitability of the suggested parcels should they become available.

Comment: One responder stated, I strongly concur that the preferred alternative -- Alternative C: Off-site, In-kind Restoration carefully crafts an integrated approach to implementing restoration alternatives for both human use and ecological services. An integrated approach, such as was developed by the Service, accounts for the complex interaction of the valuable natural resources in Great Swamp. This responder also offered several observations of historical reference about the remedial actions at OU-3.

Service response: The Service is appreciative of this responder s concurrence and historical insight. The Service has incorporated the responder s historical references and editorial comments where appropriate.

Comment: One responder strongly advocated the Service to maximize the amount of monies available for land acquisition, and avoid using restoration funds for actions which could be funded via the Refuge s operational budget.

Service response: The Service has selected an alternative which contains a robust land acquisition component. This component serves to replace natural resources and the services they provided that were lost or injured at OU-3. Protection in perpetuity would thereby be bestowed to the acquired and restored natural resources and the services provided by those resources.

The purpose of restoration is to address injuries to natural resources, including the services, ecological functions, and human uses the resources provided; this includes returning the resources to a baseline condition. Other actions that the Service has proposed (e.g., control of invasive species, restoration of vernal wetlands) in addition to replacement of lost resources and acquisition of additional resources, are acceptable restoration options for restoring, rehabilitating, or enhancing natural resources injured by OU-3 contamination. The fact that the natural resource injury occurred within a National Wildlife Refuge, which may have the means of conducting "restorative" activities within it s operational budget does not preclude restoration alternatives or action other than land acquisition from being applied.

The Service has selected an alternative which provides a well-balanced combination of actions, activities, and programs that collectively will achieve substantial restoration benefits for the GSNWR, the public, and the trust resources themselves. By selecting an alternative comprised of several discrete, yet interdependent activities, there will be a higher probability of overall implementation success than by relying on more limited, single track plans. Furthermore, the combination of land acquisition and resource restoration activities proposed in this plan ensures replacement of lost natural resource values and services in a reasonable time frame.

10.0 Literature Cited

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